

Project Plan: Boulder-Elkhorn TPA

Project ID: MO7-TMDL-01

Target Completion: December 2011

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Basic TMDL Scope:

TMDLs	Number of Segments
Metals	15 (63 pollutant-water body combos)
Nutrients	5 (6 pollutant-water body combos)
Sediment, Turbidity	11 (13 pollutant-water body combos)
Temperature	3

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PROJECT BASIS

This project plan is for TMDL development within the Boulder-Elkhorn TMDL Planning Area. This section provides an overview of the legal driver for TMDLs and the steps involved in TMDL development and how this project plan is used for quality control purposes during the TMDL process.

Congress passed the Water Pollution Control Act, more commonly known as the Clean Water Act, in 1972. The goal of this act is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” The Clean Water Act requires each state to set water quality standards to protect designated beneficial water uses and to monitor the attainment of those uses. Fish and aquatic life, wildlife, recreation, agriculture, industrial, and drinking water are all types of beneficial uses designated in Montana. Streams and lakes (also referred to as water bodies) not meeting the established standards are called *impaired waters*.

The water bodies with their associated impairment causes are identified within a biennial integrated water quality report developed by DEQ. Both Montana state law (Section 75-5-701 of the Montana Water Quality Act) and section 303(d) of the federal Clean Water Act require the development of total maximum daily loads (TMDLs) for impaired waters where a measurable pollutant (for example, sediment, nutrients, metals or temperature) is the cause of the impairment. The water body segments with pollutant impairment causes in need of TMDL development are contained within the 303(d) List portion of the State’s integrated water quality report. The integrated report identifies impaired waters by a Montana water body segment identification, which is indexed to the National Hydrography Dataset.

A TMDL refers to the maximum amount of a pollutant a stream or lake can receive and still meet water quality standards. The development of TMDLs and water quality improvement strategies in Montana includes several steps that must be completed for each impaired water body and for each contributing pollutant (or “pollutant/water body combination”). These steps include:

1. Characterizing the existing water body conditions and comparing these conditions to water quality standards. During this step, measurable target values are set to help evaluate the stream’s condition in relation to the applicable standards.
2. Quantifying the magnitude of pollutant contribution from the pollutant sources
3. Determining the TMDL for each pollutant, based on the allowable loading limits (or loading capacity) for each pollutant/water body combination.
4. Allocating the total allowable load (TMDL) into individual loads for each source (referred to as the load allocations or waste load allocations).

TMDL Development Quality Assurance requirements are obtained via the TMDL Project Planning process. This process includes the development of a TMDL Project Plan project as a first tier. The TMDL project plan justifies the need for a data collection and source assessments that typically involve the development of one or more Sampling and Analysis Plans (SAPs) or modeling project plans as a second tier of quality assurance planning. This tiered process is a logical approach for a large and complex environmental project, such as TMDL development, that may involve several separate sampling and source assessment tasks. These unique monitoring and assessment tasks are often implemented over a two to three year period and are

all are integrated within the larger TMDL project via the TMDL project plan. This approach improves efficiency and quality by providing an effective and timely way to integrate improved assessment or sampling methods during the TMDL project implementation period

PART ONE – BASIC SCOPE AND PROJECT MANAGEMENT

1.1 Introduction

This document presents a plan for completing metals, nutrients, sediment, and temperature TMDLs in the Boulder-Elkhorn TPA. It will also provide watershed stakeholders with an understanding of the basic approach and schedule for completing these TMDLs. The plan specifies the project goals and objectives, and defines the project scope in terms of the study area boundaries, water bodies to be addressed, and pollutants to be considered. The project scope is built upon a Scoping Decision Document (May 10, 2010). The tasks that will need to be conducted in order to complete the TMDLs are briefly described. Because each successive task will build upon the results of the previous tasks, it is important to note that the scope of work and schedule does evolve over time. Future modifications/updates will be presented in **Part 8** as amendments to this document.

1.2 Project Area

The project area is completely contained within Jefferson County and includes the towns of Basin, Boulder, and Elkhorn (**Figure 1-1**).

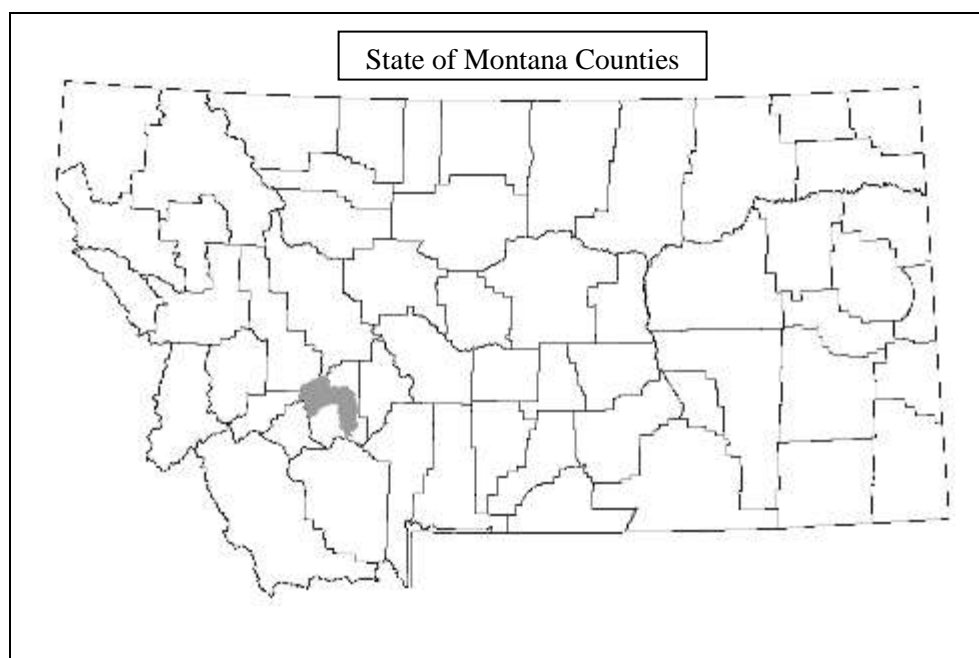


Figure 1-1: Location of the Boulder-Elkhorn TMDL Planning Area in Montana

The Boulder-Elkhorn TPA encompasses the entire Boulder River watershed from its headwaters to the confluence with the Jefferson River at Cardwell, MT. The TPA coincides with the 1002006 fourth-code hydrologic unit code (HUC), and is bounded by the continental divide on the west, the Elkhorn Mountains to the north, and Bull Mountain to the southwest. The total extent of the watershed is 487,142 acres, or approximately 760 square miles. **Figure 1-2** shows the extent of the planning area and also its listed streams.

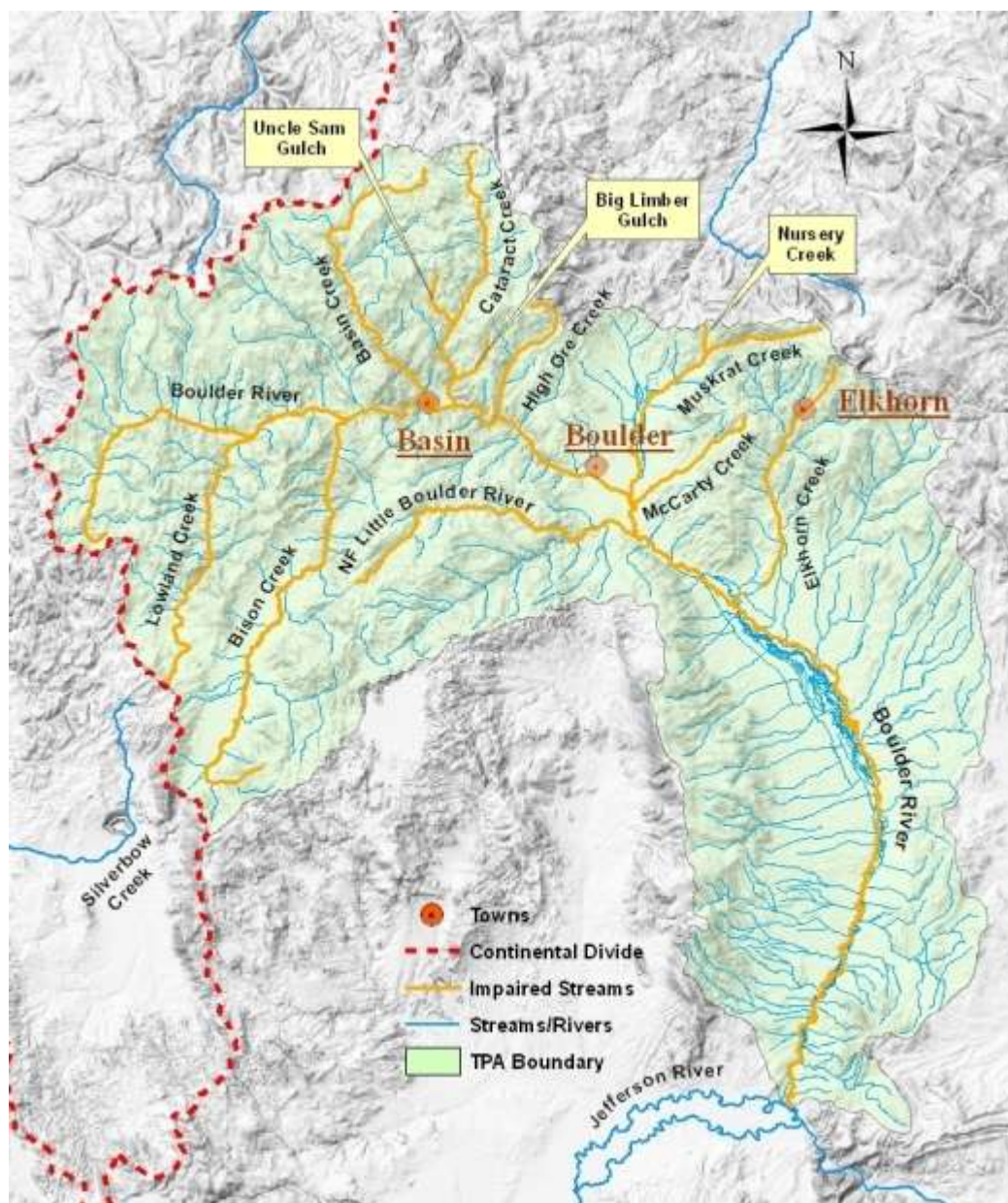


Figure 1-2: Boulder-Elkhorn TPA and 2008 303(d) listed streams

1.3 TMDL Pollutant Scope and Rationale

Based on the scope and schedule decision document referenced above in the Introduction, this project plan addresses all pollutant-water body combinations on the 2008 303(d) List, which includes metals, nutrients, sediment, turbidity, and temperature parameters. The listed water bodies are identified in **Table 1-1** below and shown above in **Figure 1-2**.

Table 1-1: 2008 303(d) listed water bodies and their listed causes in the Boulder-Elkhorn TPA where TMDL development will be pursued

Water Body	Metals	Nutrients	Sediment	Turbidity	Temperature
Basin Creek	X		X		
Big Limber Gulch	X				
Bison Creek	X	X			
Boulder River, Headwaters to Basin Creek	X				
Boulder River, Basin Creek to Town of Boulder	X				
Boulder River, Town of Boulder to Cottonwood Creek	X		X		X
Boulder River, Cottonwood Creek to the mouth (Jefferson River)	X		X		X
Cataract Creek	X	X	X		
Elkhorn Creek, Headwaters to Wood Gulch	X		X		
Elkhorn Creek, Wood Gulch to mouth (Boulder)	X		X		
High Ore Creek	X		X		X
Little Boulder River	X				
North Fork Little Boulder River		X	X		
Lowland Creek	X				
McCarty Creek		X	X		
Muskrat Creek	X				
Nursery Creek		X	X		
Uncle Sam Gulch	X	X	X	X	

1.4 Non Pollutant Causes

Pollution listings in the 2008 Integrated 305(b)/303(d) Water Quality Report include habitat alterations and flow alterations on the water bodies listed in **Table 1-2**. These listings may be addressed / included in the sediment and habitat assessment work dependent upon sediment stratification results and available resources. Pollution listings and recommended BMPs will be discussed, however, in the TMDL document.

Table 1-2: 2008 305(b) pollution listings for the Boulder-Elkhorn TPA

Water Body	Habitat Alterations			Flow Alterations	
	Alteration in stream-side or littoral vegetative covers	Physical substrate alterations	Fish-Passage Barrier	Low flow alterations	Other flow regime alterations
Basin Creek	X				
Bison Creek	X				
Boulder River, Basin Creek to Town of Boulder	X				
Boulder River, Town of Boulder to Cottonwood Creek	X			X	
Boulder River, Cottonwood Creek to mouth (Jefferson River)	X			X	
Elkhorn Creek, Headwaters to Wood Gulch	X			X	
Elkhorn Creek, Wood Gulch to mouth (Boulder River)				X	
High Ore Creek	X				
Little Boulder River	X	X			
Lowland Creek	X	X			
McCarty Creek	X		X	X	
Muskrat Creek	X				
North Fork Little Boulder River	X				
Uncle Sam Gulch	X				X

PART TWO - ISSUES / DETAILS / CONCERNS

2.1 Linkage to Other TMDLs

There are no upstream considerations since the listed streams in this planning area are all headwater streams. The Boulder River flows into the Jefferson River within the Lower Jefferson TPA. The Jefferson River is identified as one segment within Montana's Integrated Report and is listed for metals, sediment, and temperature.

There are ongoing TMDL development activities for all three of these pollutants in the Jefferson River as part of the Upper Jefferson TMDL project. Metals TMDL development in the mainstem of the Jefferson River, both above and below the Boulder River, is in progress. The metals TMDL development work for the Boulder River is, therefore, being pursued in coordination with the Jefferson metals TMDL development effort.

Sediment and temperature TMDL development for the Jefferson River is also in progress, but the focus is on the reach of the Jefferson River above the Boulder River. Sediment and temperature TMDL development for the lower reach of the Jefferson River below the Boulder River is in the pre-planning stage. Sediment and temperature TMDL work from the Boulder River project will ultimately be applied toward any future sediment and temperature TMDL work within the lower reach of the Jefferson River.

2.2 Stakeholder Interest and Outreach

Landowners have been generous in granting property access for sampling purposes. Many have shown interest in learning about the quality of the water, and have also provided information on land management activities and their thoughts on potential sources. The Lower Jefferson River Watershed Council has shown strong participation interest by actively seeking updates, requesting information, and providing feedback. Details of stakeholder outreach are located in **Part Five** of this plan.

2.3 Funding Strategy

Significant activities, such as water quality sampling or source modeling, will be accomplished via contracts directly between DEQ and consulting firms. These are identified within Part 4 of this project plan. No third party subcontracts are anticipated.

2.4 Potential Resource Impacts

All streams in the planning area are in the B-1 use classification category. Westslope cutthroat trout are native to the TPA and are designated "Species of Concern" by Montana Fish, Wildlife, and Parks. Other native species include mountain whitefish, mottled sculpin, longnose dace, and longnose sucker. The Boulder River does not appear to be an important economic fishery resource. However, the Boulder River and its tributaries are an important source of water for irrigation and livestock, particularly in the lower portions of the river.

2.5 Permitted Point Sources

The Town of Boulder's wastewater treatment facility (MT0023078) discharges to the Boulder River and may require a waste load allocation (WLA) for sediment. The Boulder Hot Springs Resort has a MPDES general permit (MT0023639) for a lagoon facility that discharges to the Little Boulder River, which is only listed for metals but does have potential sediment-linked pollution listings. The unincorporated town of Basin has an aerated lagoon and infiltration ponds that discharge to ground water, but is classified as non-discharging and does not have a permit.

The OT Mining Corporation holds Montana Groundwater Pollution Control System permit number MTX000014 for the discharge of wastewater from silver ore processing to groundwater at a facility near the Town of Basin. The permit specifies instantaneous maximum groundwater concentration limits for nine dissolved metals parameters, nitrate nitrogen, sulfate and pH.

At the time of this plan's development, a query of EPA's ICIS database returned eight active general permits for storm water construction activities, mainly along the Boulder River. There were also two general permits for storm water associated with mining, oil, and gas, including Golden Sunlight Mines' discharge to the Jefferson Slough and Elkhorn Goldfields' Elkhorn Mine Site.

Reclamation work at the Comet Mine is complete. The Josephine mine has current restoration activities, and no work has been completed on the Bullion-Crystal mine complex. The Basin Creek Mine property, located near the divide between Basin and Tenmile Creeks, is now owned by DEQ and is operated as the Luttrell Depository. This facility provides encapsulated disposal for mine and mill waste from former mining sites in the region.

2.6 Source Complexity

All TMDLs from this planning area could impact future allocations downstream in the Jefferson River.

Metals:

Metals source complexity varies by water body but is generally moderate due to the large number and variable size of abandoned mines in the TPA. Mining influences on sediment quality extend to the lower reaches of the Boulder River. There are 29 priority mine sites in the planning area. Individual or composite WLAs will be required for abandoned mines or complexes with discharging adits and/or discharges from waste rock and tailings.

The Golden Sunlight Mines, Inc. holds operating permit number 00065 for its open pit mine and cyanide vat leach operation near Whitehall. Surface water and groundwater from the mine area flow to the Jefferson Slough, a wetland area containing a former channel of the Jefferson River. The Boulder River enters the Jefferson Slough to the east of potential mine influences on water quality. Water quality monitoring sites supporting Boulder River TMDLs have been located to isolate any potential mine influence near the Boulder River mouth.

Extensive metals analysis data is available for streams in the Basin Mining District from USGS, MBMG, and DEQ Remediation Division studies.

Nutrients:

Nutrient sources vary by listed segment but are mainly from agricultural and livestock sources adjacent to listed segments. The link between potential nutrient sources and elevated chlorophyll-*a* in Cataract Creek is unclear and monitoring is on-going. Residual nutrient loading may be occurring from recently burned forests. Although residential development sources are present, no large-scale development or land use changes are occurring in the watershed. Neither of the two stream segments receiving discharges from NPDES permitted domestic wastewater facilities is nutrient listed. Source complexity is low to moderate.

Sediment:

Source complexity is low. Land uses within the TPA consist of largely agricultural activities of cattle ranching and irrigated hay/crop production in the valley bottom, and some limited timber harvest in the uplands. Historic mining activities and past timber harvest may have had residual effects on stream channel condition and sediment loading throughout the watershed and effects from these activities are still apparent along some streams. Roads parallel and within close proximity to many streams in the watershed also appear to be an obvious source of sediment. Sources as identified are not actively changing and appear to be confirmed through early field reconnaissance.

Temperature:

High Ore Creek and the lower two segments of the Boulder River are listed for temperature impairment. Source complexity on the Boulder River is moderate due to a complex network of irrigation diversions and returns, especially around Elkhorn Creek. Natural springs also influence water temperatures in the Boulder River. In addition, riparian vegetation quality fluctuations throughout the stream corridor affects temperature in the Boulder River, however this source is generally easily evaluated and incorporated into modeling scenarios. Source complexity for High Ore Creek is low with the majority of temperature impact on this stream a result of the historic mining and degradation of riparian vegetation along the stream corridor.

PART THREE – MINIMUM LEVEL OF DESIRED DETAIL

Based on the information identified in Part 2, the minimum level of desired detail for each pollutant is defined below, along with a description of the level of detail that will be pursued based on available resources and schedule constraints. Source complexity, stakeholder interests, population growth, land use changes, beneficial uses and resources to protect, and TMDL schedule requirements are all significant considerations that are incorporated into the desired level of detail determination. As described below, the desired level of TMDL development detail within the watershed is generally varies from low to medium based on all of these factors.

- Metals: A medium level of detail is desired for several drainages due to:
 - Moderate level of mining source complexity.
 - Potential downstream loading to the metals (Pb and Cu) to the metal-impaired Jefferson River,
 - Ongoing remediation within several Boulder River tributary watersheds,
 - General stakeholder interest in the planning process,

A medium level of detail warranted in the Basin, Cataract and High Ore creek drainages due to the large number of potential sources. Additional monitoring is needed to supplement available metals chemistry and abandoned mine source characterizations.

A low-to-medium level of detail will be applied in Bison, Lowland, Elkhorn Creek, Muskrat Creeks and the Little Boulder River due to fewer sources and fewer metals listings.

- Nutrients: Although complexity will vary by water body, a low-to-moderate level of detail is anticipated for nutrient TMDLs and allocations based on the limited number conceivable loading sources (i.e. background, composite agricultural, and/or mining contributions) and the fact that nutrient listings are restricted to headwaters tributaries to the Boulder River. Existing data, additional analysis results from 2010 monitoring, and application of a simple landscape-scale nutrient loading model is sufficient to adequately quantify significant sources and guide allocation development
- Temperature: There are two water bodies listed for temperature impairment in the Boulder-Elkhorn TPA: High Ore Creek, and the Boulder River (from the town of Boulder to the mouth).
 - High Ore Creek: A low level of detail is desired for the temperature TMDL associated with High Ore Creek. Historic mining throughout this 6 mile creek has dramatically altered the stream channel and denuded the riparian corridor. This influence, along with forestry and other agricultural practices, has contributed to the most significant and obvious impact to address temperature impairment:

riparian health improvement. Few tributaries and irrigation withdrawals exist in this watershed.

- Boulder River: A medium level of detail is desired for the temperature TMDL associated with the lower two segments of Boulder River. The agricultural practices, extensive irrigation ditch network, and braided nature of the stream channel through sections of the river will make identifying sources of temperature impacts difficult. Multiple locations for data collection, along with the incorporation of collected data with a QUAL2K water quality model will be required to characterize temperature conditions in the river and identify potential improvement strategies.
- Sediment: A low-to-medium level of detail is warranted for the sediment TMDLs in the Boulder-Elkhorn TPA. In general, there is limited source complexity, with the three major sources of sediment; roads, upland erosion, and bank erosion. However the extensive presence of roads, both in private and Forest Service ownership, that parallel many of the streams in this watershed, coupled with the occurrence of westslope cutthroat trout (a “species of concern” identified by the FWP), as well as a few MPDES permits in the watershed may require a slightly more rigorous quantification and distribution of allocations in some of the listed stream watersheds.

PART FOUR – SCHEDULE AND STRATEGY

A single document addressing TMDLs for all pollutant categories (metals, nutrients, sediment and temperature) is anticipated. Tasks for completion of each pollutant category are outlined below and correspond to 2 separate schedules: **Attachment 1, Metals and Nutrients TMDL Schedule**, and **Attachment 2, Sediment and Temperature TMDL Schedule**. Document production tasks for each pollutant can be combined, although they have not been combined in this section. **Attachment 3, Boulder-Elkhorn Composite Schedule**, details the tasks common to all pollutant categories.

In addition, there is only one watershed characterization task for this project, described as follows:

A draft watershed characterization has been completed for the Boulder-Elkhorn TPA that describes the physical, cultural and ecological context of the planning area. The draft will require editing to conform to the current version of the TMDL document and include mention of several of the larger past and ongoing abandoned mine remediation efforts occurring in the planning area outline. These include the Comet Mine in High Ore Creek, the Josephine-Basin Creek complex in the Basin Creek headwaters and the Bullion Mine in the Jack Creek drainage (Basin Creek tributary). The 18 figures prepared in drafting this document section will be compiled into a single appendix.

The specific tasks associated with each of the four major pollutant categories (metals, nutrients, sediment and temperature) are defined in the following sections. These tasks are defined in such a way to reflect the overall strategy while incorporating the level of detail identified in Part 3.

4.1 Metals

4.1.1 Metals Listings

Pending final impairment findings based on the current data and 2010 sampling results, metals TMDLs will be pursued for the streams and metal causes listed in **Table 4-1**. Metals TMDLs are considered separately from the habitat alteration listings for metals impaired streams. Any metals TMDLs not pursued because of a review of existing data will be discussed within the TMDL document.

Table 4-1: Metals Impairment Listings in the Boulder-Elkhorn TPA for 2008

Segment Name	Water Body Segment ID	Probable Causes	TMDL Category
Basin Creek headwaters to mouth (Boulder River)	MT41E002_030	As, Hg, Pb, Cu, Zn	Metals
Big Limber Gulch headwaters to mouth (Cataract Creek)	MT41E002_140	Pb, Hg	Metals
Bison Creek	MT41E002_070	Cu, Fe	Metals

Table 4-1: Metals Impairment Listings in the Boulder-Elkhorn TPA for 2008

Segment Name	Water Body Segment ID	Probable Causes	TMDL Category
headwaters to mouth (Boulder River)			
Boulder River Headwaters to Basin Creek	MT41E001_010	Cd, Cu, Fe, Pb Zn	Metals
Boulder River	MT41E001_021	Cd, Cu, Fe, Pb, Ag, Zn	Metals
Boulder River	MT41E001_022	Cu, Fe, Pb, Ag, Zn	Metals
Boulder River	MT41E001_030	As, Cd, Cu, Pb, Zn	Metals
Cataract Creek	MT41E002_020	As, Cd, Cu, Hg, Pb, Zn	Metals
Elkhorn Creek	MT41E002_061	As, Cd, Cu, Pb, Zn	Metals
Elkhorn Creek	MT41E002_062	Cd, Cu, Pb, Zn	Metals
High Ore Creek	MT41E002_040	As, Cd, Cu, Hg, Pb, Zn	Metals
Little Boulder River	MT41E002_080	Cu, Zn	Metals
Lowland Creek	MT41E002_050	Al, Cu, Ag	Metals
Muskrat Creek	MT41E002_100	Cu, Pb	Metals
Uncle Sam Gulch	MT41E002_010	As, Cd, Cu, Pb, Zn	Metals

4.1.2 Metals TMDL Development Tasks and Strategy

The following tasks correspond to **Attachment 1, Metals and Nutrients TMDL Schedule**. These tasks follow the basic TMDL development approach consistent with EPA guidance and previous TMDLs developed in Montana. Each task includes a short description that also provides additional TMDL development strategy information for target development, source assessment work, defining the TMDL, and developing allocations.

Task 1 - Watershed Characterization

Refer to description within introductory language at the beginning of Part 4.

Task 2 - Metals Data Compilation

Metals water chemistry data from National Water Information System (NWIS) and EPA, STORET sources were first compiled in 2009 using the SANDS program. The SANDS extracted data is that from fourth-code hydrologic unit code (HUC) 10020006 that has the same boundaries as the Boulder-Elkhorn TPA. Metals and nutrient data collected in the planning area during the 2009 field season (Doc. No. M07TMDL01SAP1) has been incorporated into the SANDS extraction file format for metals. An updated SANDS extraction is needed to incorporate ongoing agency monitoring. The DEQ Abandoned Mines water and sediment GIS layers and databases have been incorporated into the TMDL project database.

Task 3 – 2010 Metals SAP Development and Implementation

A sampling and analysis plan has been developed for collection of additional flow, sediment metals and water column metals data for high and low flow conditions during 2010.

Task 4 – Metals Targets and Existing Conditions***Task 4a. Metals Target Development*****Metals and pH**

Numeric water quality standards (adjusted for hardness where needed) will be applied as metals targets. This includes both the 4 day average for chronic standards and instantaneous criteria for acute standards as applicable. Additional metals targets will include the numeric human health standards for arsenic and mercury and the National Atmospheric and Oceanic Administration (NOAA) screening criteria for inorganics in sediment. Targets for pH will be based on the allowable variation from naturally occurring conditions as defined by Montana's pH narrative standard. Because of uncertainty regarding naturally occurring pH values, meeting the pH targets will be closely linked to meeting the numeric metals targets. Ecoregional values for the Multimetric Index (MMI) for macroinvertebrates and the River Invertebrate Prediction Classification System (RIVPACS) index will serve as supplemental targets.

Task 4b. Existing Metals Loading Conditions/Target Departure Assessment

Water chemistry results for metals and pH causes will be compared with targets within each water body segment. Target departures will be summarized in tables and illustrated in flow duration curves where sufficient flow data are available. Sediment metals chemistry target departures will be symbolized, illustrated spatially where feasible and summarized in tables. Macroinvertebrate metric results will be summarized in tables by listed segment.

Task 5 – Metals Source Assessments, TMDLs, Allocations and MOS***Task 5a. Metals Source Assessment***

Loading sources will be identified by the magnitude of in-stream metals target departures and their distribution in the watershed. Water quality and flow data from specific loading sources described in mine inventory, closure and remediation reports and databases will supplement the spatial interpretation of the monitoring record. Accounts of historic and recent mine development from impact analysis documents and reclamation project reports will be reviewed for information on likely pollutant pathways to listed segments.

The uncertainty in the loading estimates will vary with the size and seasonality of the data from each segment. Uncertainty will be described in terms of the strength of the monitoring record and assumed relationships between source locations, loading processes and impacts to beneficial uses.

The source assessment includes an analysis process to estimate background loading conditions using data collected from undeveloped tributaries.

Task 5b. Draft Metals TMDLs, Allocations, and Margin of Safety (MOS)**TMDL Expression**

Metals TMDLs will be expressed with a daily loading equation containing numeric aquatic life or human health standards multiplied by estimates of mean daily flow. Instantaneous loading equations will be developed to ensure compliance with acute numeric standards. Where flow and pollutant concentration data are sparse, high and low flow example TMDLs will be selected from the datasets for each segment. Load duration curves will be used to quantify and illustrate metals TMDLs where annual hydrographs can be developed from flow records. Loading datasets will be compiled by segment in an appendix. Impairments caused by pH are assumed to be addressed by metals TMDL development, therefore, pH TMDL development will be addressed by one or more metals TMDLs per water body.

TMDL Allocations Strategy

Metals analysis results with associated flow measurements will be graphed individually with the TMDL duration curve to identify significant sources and determine their relative contributions. Either load or waste load allocations are anticipated for the following sources:

- Estimated background loading,
- Mine portal discharges,
- Specific historic mine complexes (e.g. Eva May complex, Cataract Creek)
- Area-weighted loading from mine waste deposits, pit areas and regarded surfaces,
- Impacted segment tributaries,
- Water or waste treatment system discharges.

Allocations to multiple sources within a single segment will consider downstream concentration changes documented in the metals monitoring record and relative physical location in the watershed. With EPA direction, composite allocations to human plus background sources may be developed where the two sources cannot be readily separated and where background metals loading is unlikely to exceed the TMDL.

The MOS for metals TMDLs may be either implicit in conservative loading analysis assumptions or explicit as a fraction of the TMDL. This an inherent MOS in the adaptive management process of adjusting allocations as suggested by monitoring results. Elements of an implicit MOS will be itemized for each TMDL document.

4.2 Nutrients**4.2.1 Nutrient Listings**

Nutrient TMDLs are being planned for Bison Creek, Cataract Creek, McCarty Creek, Nursery Creek and Uncle Sam Gulch (**Table 4-2**). Listings for TKN and $\text{NO}_3+\text{NO}_2\text{-N}$ will be addressed by TMDLs developed for TN unless source assessment findings suggest otherwise.

Table 4-2: Nutrient Listed Waters within the Boulder-Elkhorn TPA (draft 2008 303(d) List)

Water Body Name, Location Description	Water Body Segment ID	Probable Causes	TMDL Category
BISON CREEK, headwaters to the mouth (Boulder River))	MT41E002_070	Nitrates	Nutrients
CATARACT CREEK, headwaters to the mouth (Boulder River)	MT41E002_020	Nitrogen, Nitrate	Nutrients
McCARTY CREEK, headwaters to the mouth (Boulder River)	MT41E002_110	Phosphorus (Total)	Nutrients
NORTH FORK LITTLE BOULDER RIVER, headwaters to the mouth (Little Boulder)	MT41E002_090	Total Kjehldahl Nitrogen (TKN)	Nutrients
NURSERY CREEK, headwaters to mouth (Muskrat Creek-Boulder River)	MT41E002_130	Nitrate/Nitrite, TKN	Nutrients
UNCLE SAM GULCH, headwaters to the mouth (Cataract Creek)	MT41E002_010	Nitrogen, Nitrate	Nutrients

4.2.2 Nutrient TMDL Development Tasks and Strategy

Task 1 - Watershed Characterization

Refer to description within introductory language at the beginning of Part 4.

Task 2 – Nutrient Data Compilation

Nutrient water chemistry data from National Water Information System (NWIS) and EPA, STORET sources were compiled using the SANDS extraction program. The SANDS extracted data is that from fourth-code hydrologic unit code (HUC) 10020006 that has the same boundaries as the Boulder-Elkhorn TPA. The DEQ Abandoned Mines water and sediment databases have also been clipped to the planning area boundaries. These data need to be compiled in the DVC file format for nutrients. Nutrient data collected in the planning area during the 2009 field season (Doc. No. M07TMDL01SAP1) has been incorporated into the SANDS DVC nutrient file format.

Task 3 – 2010 Nutrient SAP Development and Implementation

A sampling and analysis plan (SAP) is being drafted by PPA, Monitoring and Assessment Section staff for collection of additional flow and nutrient chemistry at from 20 to 25 sites during 2010.

Task 4 - Nutrient Targets and Existing Conditions***Task 4a. Nutrient Target Development***

Middle Rockies Ecoregional targets for TN, TP and N_{3+2} -N under development by DEQ will be used to assess compliance during the growing season with the narrative standard protecting against growth of undesirable aquatic life. Supplemental nutrient targets include:

- Numeric standards for dissolved oxygen (DO) for B-1 streams with early aquatic life stages present,
- Benthic algae production as reflected in chlorophyll-a concentration for support of primary contact recreation

The MMI and RIVPACS macroinvertebrate metric targets for the applicable geographic setting will be applied as supplemental nutrient targets.

Task 4b. Existing Nutrient Conditions and Target Departures

Water chemistry results for nutrients will be compared with growing season targets for TN, TP and N_{3+2} -N. The results for nutrient chemistry parameters and chlorophyll-*a* will be used in conjunction with statistical tools developed for compliance testing to characterize impairment for each segment. TMDL development conclusions for nutrients will be summarized in tables.

Task 5 – Nutrient Source Assessments, TMDLs, Allocations and MOS***Task 5a. Nutrient Source Assessment***

The nutrient source assessment will have two main components:

1. An assessment based on target departure and sample location interpretations, and
2. Mathematically modeled estimates of annual or seasonal TN and TP loading based on watershed scale considerations of climate, land cover and land management variables.

A simple empirical loading model will be applied at a scale needed to characterize impaired watersheds. Model inputs are general climate and land cover data. Loading is calculated from assigned curve numbers, erosion factors and nutrient export coefficients. Model parameters would be set to reflect existing watershed conditions. The relative contribution to loading from land cover or land use sources will help to identify significant sources. Programs under consideration are the Spreadsheet Tool for Estimating Pollutant Loads (STEPL) developed by Tetrtech, Inc. and the General Watershed Loading Functions (GWLF) model developed by Cornell University. Model outputs of annual or seasonal loads would be distributed into daily amounts according to stream hydrographs.

Task 5b. Draft Nutrient TMDLs, Allocations, and Margin of Safety (MOS)

Growing season nutrient TMDLs will be expressed as example daily loading equations using ecoregional nutrient targets and mean daily stream flows. Mean daily data are available from a limited number of USGS gage sites in the planning area. Where discharge data are not available, flow conditions will be extrapolated from similar basins. Where discharge records allow, TMDLs will be illustrated as load duration curves.

Allocation will be developed for natural background and human-caused sources and expressed as daily loads.. The allocation to background sources will be estimated from stream flow and analytical data from minimally impacted watersheds. Allocations to human caused sources will be a composite of contributions from agricultural production. An allocation to mining sources will be included if mining activities can be linked to elevated nutrient levels. As appropriate, these allocations will be guided by proportional load contributions calculated from modeled condition reflecting BMP applications. Nutrient allocations may also be guided by the analytical record of spatial changes in pollutant concentration.

The MOS for nutrients will be implicit in the selection of conservative values for loading-related parameters in the model framework. Elements of an implicit MOS will be itemized for each TMDL pollutant category.

Task 6 - Stakeholder Reviews of Draft Metals and Nutrient Source Assessments,TMDLs, Allocations, and MOS

Draft metals and nutrient source assessments, TMDLs and allocations will be compiled based on the above analysis and presented to the TAG. Comments from the TAG will be considered and included where appropriate.

Task7 – TMDL Document Introduction, Standards, Problem Description, Framework Restoration Approach, Monitoring Plan, and Adaptive Management

Draft sections, using available templates, will be inserted into the current version of the TMDL document outline, drafted and saved as section files in the Boulder-Elkhorn project path and routed as needed for review.

Task 8 – Document Formatting

Edited section files s will be copied to the public review draft folder in the project path as they are completed and administrative staff will be noticed regarding formatting needs. Formatting will be according to the most current guidance.

4.3 Sediment

4.3.1 Sediment Listings

Pending final impairment findings based on the current data and 2010 sampling results, sediment TMDLs will be pursued for the streams and sediment related causes listed in **Table 4-3**. Sediment TMDLs are considered separately from the habitat alteration listings for sediment

impaired streams, however linkages between the cause and effects may apply. Additional streams listed only for non-pollutant causes may be included in the overall TMDL related assessment methods conducted as part of this project, the results of which may lead to the development of TMDLs for streams not shown in Table 4-3. (These streams include Bison Creek, Little Boulder River, Lowland Creek, and Muskrat Creek.) Any sediment TMDLs not pursued after review of existing data will be discussed within the TMDL document.

Table 4-3: Sediment Impairment Listings in the Boulder-Elkhorn TPA for 2008

Segment Name	Water Body Segment ID	Probable Causes	TMDL Category
Basin Creek	MT41E002_030	Sedimentation/Siltation	Sediment
Boulder River	MT41E001_022	Sedimentation/Siltation	Sediment
Boulder River	MT41E001_030	Sedimentation/Siltation	Sediment
Cataract Creek	MT41E002_020	Sedimentation/Siltation	Sediment
Elkhorn Creek	MT41E002_061	Sedimentation/Siltation	Sediment
Elkhorn Creek	MT41E002_062	Sedimentation/Siltation	Sediment
High Ore Creek	MT41E002_040	Sedimentation/Siltation, Total Suspended Solids	Sediment
McCarty Creek	MT41E002_110	Sedimentation/Siltation	Sediment
N. Fork Little Boulder Creek	MT41E002_090	Sedimentation/Siltation	Sediment
Nursery Creek	MT41E002_130	Sedimentation/Siltation	Sediment
Uncle Sam Gulch	MT41E002_010	Sedimentation/Siltation, Turbidity*	Sediment

* Turbidity is to be addressed through the Sedimentation/Siltation TMDL development. All Sediment TMDL allocations apply to Turbidity cause as well.

4.3.2 Sediment TMDL Development Tasks and Strategy

The following tasks correspond to **Attachment 2, Sediment and Temperature TMDL Schedule**. These tasks follow the basic TMDL development approach consistent with EPA guidance and previous TMDLs developed in Montana. Each task includes a short description that also provides additional TMDL development strategy information for target development, source assessment work, defining the TMDL, and developing allocations.

Task 1 - Watershed Characterization

Refer to description within introductory language at the beginning of Part 4.

Task 2 – Sediment Data Compilation

To date, little recent sediment and habitat data has been compiled for the Boulder-Elkhorn TPA. Investigation and assessment of the sediment and habitat conditions for the impaired streams will begin in 2010 as described below.

Task 2a. Data Compilation

Sediment and habitat data from all pertinent agencies and local resources will be gathered and included in TMDL analysis. Data compilation will occur throughout 2010.

Task 2b. New Data Collection

To maintain consistency with the data types and collection methods across the TPA, a sampling analysis plan will be developed for collection of sediment and habitat data. The outcome of this effort will allow for a controlled representation of data across the streams of interest in the watershed, while at the same time provide the ability for past data collected by DEQ or other agencies to have better comparability to current data. This task is an important component of the target development (Task 3) and is intended to better understand the condition of the watershed, potential trends, and to put the issues affecting the watershed into perspective. New sediment and habitat will be collected in the summer of 2010, upon completion of the stratification and sampling analysis plan development.

Stratification and Recon

In order to properly investigate sediment concerns as they relate to the influencing factors throughout the streams of interest, a stratification process has been developed which identifies unique reaches based on a number of criteria. Reaches are grouped into like categories based on Ecoregion, Stream Order, Valley Slope, and Valley Confinement. Within each identified reach, sub-reaches are also identified to discern potential differences in stream response due to land use and riparian condition. The entire stratification exercise is done using GIS and aerial imagery. Once the stratification is completed, field reconnaissance is conducted to ground truth the characteristics of each reach, and to ensure that reach breaks occur in appropriate locations.

The resulting stratification process allows for a method to focus on those areas of streams most likely to illustrate sediment impairment (depositional reaches), and allows for a way to apply information from a sub-set of sampled reaches to similar reaches of the same character. This then allows for prediction of stream condition and sediment loads without actually surveying all stream miles. Stratification of the Boulder-Elkhorn TPA was completed in March 2010.

Sampling Analysis Plan

The DEQ will complete a Sampling Analysis Plan for Sediment and Habitat investigation following completion of the stratification. The SAP will identify all sites scheduled for data collection across the listed streams of interest in the Boulder-Elkhorn TPA. The sites will represent a range of reach categories and stream conditions. The SAP will detail the purpose of the study and appropriate QA/QC measures that are to be undertaken. The SAP will also reference the Longitudinal Field Methodology for the Assessment of TMDL Sediment and Habitat Impairments (DEQ rev.2010) which describes all procedures and data to be collected. SAP to be completed in May 2010.

Field Data Collection

The completed SAP will identify field data collection sites, based from the results of the stream reach stratification, and will be investigated in the summer of 2010. Within each reach the investigating field crew conducts a riparian greenline assessment which categorizes the understory, midstory, and canopy vegetation throughout each cell. Cross sections are completed at five locations within each reach. Cross sections provide bankfull width measurements, cross sectional area at channel forming conditions, floodprone width, and other geomorphological information. Additionally, riffle pebble counts and grid toss pebble counts are conducted in 3 locations to provide information about substrate quality and distribution, as it relates to fish and aquatic life. Longitudinal profiles are also completed throughout the length of the study reach to measure and quantify the size and number of riffles and pools encountered, as well as count the amount of effective large woody debris. Finally, BEHI studies on the number and types of eroding banks throughout the reach are conducted in order to quantify sediment loads. Banks are also categorized by whether they appear to be naturally or anthropogenically influenced.

Contract

A contract for assistance with development of the Sampling Analysis Plan, completion of field work, and reporting of results will be established by the end of April 2010. The hired contractor will work in coordination with the Sediment Project Manager. Field data collection to occur in August or September of 2010, with reporting of results to be completed by the end of the year.

Compile and Report

All data gathered during the sediment field data collection will be compiled and analyzed the results of which will be used to assist with target development, impairment assessment, and load quantification from bank erosion. This information will be presented within the context of the TMDL and water quality restoration plan document.

Task 3 – Sediment Target Development

Montana State standards for sediment are narrative and do not detail specific values or parameters by which to conclude definitive impairment. In order to interpret these standards, target parameters and values are developed to better assess stream conditions and impact from sediment.

3a. Initial Sediment Target Recommendations

Initial target recommendations for sediment will be based on the product of the 2010 field data collection effort and other available data. Quartile statistics will be reviewed for each of the parameters of concern and recommendations will be made based on this analysis. Statistics will be looked at both for the total population, and reach category specific. Because reach categories account for a variety of stream channel conditions, multiple targets may be considered which would be qualified by the type of reach (depositional vs. transport) or by Rosgen stream reach classification. Target recommendations will account for the appropriateness of the data to

represent natural or most desired conditions in the presence of anthropogenic influences. Target parameters are likely to include percent fines <6mm and <2mm, pool numbers and residual depths, large woody debris numbers, width to depth ratios, and riparian canopy conditions.

3b. Available Data Analysis/Organization

In addition to the target development based on the 2010 field work, available sediment and habitat data from other agencies or past efforts will be collected and reviewed for compatibility to the 2010 field effort. It is assumed that multiple efforts have been conducted throughout the Boulder-Elkhorn TPA by differing agencies however methods and parameters of interest may vary. Additional data locations will be converted into a GIS layer and evaluated to allow for comparison to the 2010 field results. Where additional data parameters and collection methods correlate, data will be used to strengthen the statistical analysis for those parameters. Depending on the amount and quality of additional available data, target parameters and values may be expanded beyond the initial target recommendations. This effort will also include reference to published studies on sediment/habitat and aquatic life/fisheries relationships, and internal and external agency data from identified “reference streams.”

3c. Draft Sediment Targets

Draft targets will be developed through a combination of on-the-ground data (results of Tasks 3a and 3b), availability of reference data from within the Boulder-Elkhorn watershed or equivalent watershed, discussion and consultation with local environmental science professionals, and appropriate scientific literature results.

3d. TAC Review & Final Draft

A technical advisory committee of local land owners and environmental science professionals with knowledge inherent to the specific issues for the streams and issues related in the watershed will convene to discuss and review the proposed target parameters and values. Comments from the TAC will be considered and included where appropriate into the final targets. Analysis of data and final target conclusions will be compiled into a report for inclusion into the TMDL document.

Task 4 – Sediment Source Assessment

The goal of this task is to identify and quantify pollutant loading from all of the potentially significant point and non-point sources within the Boulder-Elkhorn TPA. Major potential sources are indicated in the sub-tasks below. Sediment load quantification will also be highly dependent on the results of the Boulder-Elkhorn basin scale watershed modeling effort as mentioned in Task 4c. **Table 4-4** describes the sediment source categories that occur in the watershed. Note that the multiple sources can be evaluated via a limited number of methods described in further detail.

Table 4-4: Sediment Source Considerations		
Source Category	Sediment Pathway	Assessment Method
Dirt Roads (Timber Harvest, Mining, Recreation, Residential)	Surface erosion	Aerial assessment and categorization of roads, with field monitoring and WEPP sediment road model development.
Dirt Roads (Timber Harvest, Mining, Recreation, Residential)	Culvert Failure & Scouring	Failure risk assessment based on field monitoring included during road crossing analysis for WEPP model, and comparison to similar watersheds and literature values.
Dirt Roads (Timber Harvest, Mining, Recreation, Residential)	Mass Wasting	Aerial Assessment Simple loading estimates (Mass wasting does not appear to be a major factor in this watershed.)
Riparian Clearing/Degradation (Timber Harvest, Mining, Grazing, Residential, Agriculture, Weeds)	Bank Erosion	BEHI methodology and extrapolation using stratification results.
Riparian Clearing/Degradation (Timber Harvest, Mining, Grazing, Residential, Agriculture, Weeds)	Reduced Buffer	Aerial assessment Streamside vegetation monitoring
Upland Clearing/Degradation (Timber Harvest, Mining, Grazing, Residential, Agriculture, Weeds)	Increased Stream Energy/Bank Erosion	Bank erosion monitoring
Stock - Grazing - Horses, etc (Agriculture, Residential)	Hill slope erosion & Runoff if overgrazed or in confined areas	Aerial photo assessment Upland sediment modeling
Dry land Agriculture	Surface and groundwater flow from soils	Aerial photo assessment Upland sediment modeling
Irrigated Agriculture	Surface and groundwater flow from soils	Aerial photo assessment Upland sediment modeling
Timber Harvest, Mining (not including roads or riparian harvest)	Hill slope erosion	Aerial photo assessment Upland sediment modeling
Mining (not including roads or riparian harvest)	Hill slope erosion	Aerial photo assessment Upland sediment modeling
Timber Harvest (not including roads or riparian harvest)	Mass Wasting	Not a significant source of concern based on observations

Table 4-4: Sediment Source Considerations		
Source Category	Sediment Pathway	Assessment Method
Natural Background	Bank Erosion	BEHI methodology and extrapolation using stratification results.
Natural Background	Hill slope Erosion	Aerial photo assessment Upland sediment modeling
Natural Background	Mass Wasting	Not a significant source of concern based on observations
Residential Development	Urban Runoff	Aerial photo assessment Upland sediment modeling
WWTP	Point Source	Monitoring data available.

4a. Bank Erosion Analysis

Bank erosion quantification will be conducted through the 2010 field effort. Bank sediment load is derived using Rosgen BEHI methods. All types of eroding banks are quantified for each study reach – both actively, visually eroding banks and slowly eroding, vegetated, undercut banks. Banks are also categorized by influencing factors contributing to erosion so as to separate loads between naturally eroding banks and anthropogenically influenced eroding banks. Bank loads for the different reach categories and their associated influencing factors are then applied to all reaches on the selected streams, based on the information from the stratification process and sediment and habitat field study. Bank erosion analysis from previous studies will also be reviewed and included into the overall assessment.

4b. Roads Analysis

Road networks have been reviewed using GIS and stratified by land ownership, road type, and subwatershed. This information will serve as the basis for a road condition Sampling Analysis Plan, to be developed in April of 2010. The SAP will identify a number of road crossings and parallel road segments to be investigated where data relevant to the input variables for running a WEPP:Roads modeling exercise. The results of the WEPP:Roads model will serve as the basis for sediment load quantification and extrapolation from road sources, as well as potential sediment reduction scenarios.

4c. Upland Erosion Inputs Analysis

“Existing” sediment loads from all potentially significant upland sources will be quantified at the scale of the entire Boulder-Elkhorn TPA and sub-watershed scale using GIS and the Universal Soil Loss Equation (USLE). Sediment loads per watershed of interest will be separated by land use category, and sediment load reduction scenarios will be based on adjustments to vegetative cover or land use type. Riparian buffers will also be incorporated into the sediment load output using a buffering efficiency factor related to an assessment of the current and potential riparian condition.

Task 5 – TMDL & Allocations

The TMDL and allocations for the pollutant/water body combinations will be linked to the results of the Tasks above. The TMDL for sediment will be calculated based on the sum of the annual loads from each of the major source types/land use categories assuming all reasonable land, soil, and water conservation practices are in effect. Source types include eroding banks, roads, and land use categories as identified in the USLE model. Appropriate allocations will be developed through an investigation of potential changes in land use practice, riparian condition, and road network quality. Allocations will be developed, based on annual loads, through partitioning the appropriate percent reductions to the source types/source areas based on case studies, literature values, model scenarios and communication with the TAC. Daily loading will also be developed through simple correlation between annual loading and stream hydrographs.

Task 5a. Draft TMDL, Allocations, and Stakeholder Reviews

Similar to Task 3d, draft TMDL and allocations will be compiled based on the above analysis and discussed with the TAC. Comments from the TAC will be considered and included where appropriate into the final TMDL and allocations. Analysis of data and final conclusions will be compiled into a report for inclusion into the TMDL document. TMDL and allocations will be developed in winter spring of 2011.

Task 6 – Document Preparation and Public Comment

In order to ensure compliance with public and stakeholder TMDL outreach requirements under state and federal law, at the completion of the Boulder-Elkhorn TPA Sediment TMDL document (Draft) the public will have a 30 day comment period to review the document and submit comments. A Final TMDL document will be prepared in consideration of public comment and submitted to EPA for review.

Task 7 – EPA Submittal

The final step in this process will be for EPA to review and approve the final TMDL document.

4.3 Temperature

4.3.1 Temperature Listings

Pending final impairment findings based on the current data and 2010 sampling results, temperature TMDLs will be pursued for the Boulder River stream segments and temperature causes listed in **Table 4-5**. Temperature TMDLs are considered separately from the habitat alteration listings for temperature impaired streams. At this time, High Ore Creek has not been scheduled for any significant review and analysis, however the less complicated nature of the conditions and obvious sources of this stream may allow for a very simple TMDL development approach and inclusion in the document. Any temperature TMDLs not pursued because of a review of existing data will be discussed within the TMDL document.

Table 4-5: Temperature Impairment Listings in the Boulder-Elkhorn TPA for 2008

Segment Name	Water Body Segment ID	Probable Causes	TMDL Category
Boulder River	MT41E001_022	Temperature, water	Temperature
Boulder River	MT41E001_030	Temperature, water	Temperature
High Ore Creek	MT41E002_040	Temperature, water	Temperature

4.3.2 Temperature TMDL Development Tasks and Strategy

The following tasks correspond to **Attachment 2, Sediment and Temperature TMDL Schedule**. These tasks follow the basic TMDL development approach consistent with EPA guidance and previous TMDLs developed in Montana. Each task includes a short description that also provides additional TMDL development strategy information for target development, source assessment work, defining the TMDL, and developing allocations.

Task 1 - Watershed Characterization

Refer to description within introductory language at the beginning of Part 4.

Task 2 – Temperature Data Compilation

Temperature, flow, and shade will be collected at multiple sites along the Boulder River. This data will be used in conjunction with a water quality model to simulate temperature fluctuation and its causes and effects, and investigate its impact to fish and aquatic life assemblages.

Sampling Analysis Plan

The DEQ will complete a Sampling Analysis Plan for Temperature impairment investigation in April of 2010. The SAP will identify all sites scheduled for data collection throughout the Boulder River. The SAP will detail the purpose of the study and appropriate QA/QC measures that are to be undertaken. The sites will represent a range of reach categories and stream conditions. Sites will be located such that they reflect tributary inputs, point sources, irrigation withdrawal and returns, and any other possible impacts to flow and/or temperature. In addition, various shade conditions throughout the stream will be assessed for application into the model.

Field Data Collection

The SAP will be implemented in the summer of 2010 with the initial deployment of temperature data loggers, and other field data collection methods to occur in July. Temperature data loggers will continuously collect data until retrieval in late September. Flow and shade measurements will also occur at the time of deployment and retrieval, with the possibility of one additional sampling event for flow in August. DEQ staff will be responsible for all field data collection.

Task 3 – Model Development for Source Assessment, Targets, and TMDL Determinations

Montana State standards for temperature are both narrative and numeric – they describe a “not to exceed” increase over naturally occurring temperature. In order to interpret these standards, naturally occurring temperatures must be determined, as well as the current departure from those temperatures. To do this, a QUAL2K water quality model will be used to simulate the temperature fluctuations throughout the Boulder River. In addition, the model will allow for scenarios to be run to determine the extent of temperature increase or decrease based on various land/water use and management conditions. The results of the model will be used to assess the sources affecting temperature, develop targets to meet the standards, and determine (thermal) TMDLs.

Contract

A contract for the development of the model will be required. Contract solicitation will occur in the spring of 2010 however model development and data analysis will not occur until all data has been collected – in the Fall of 2010. Contract will be funded through DEQ funds.

Compile and Report

All data gathered during the temperature field data collection will be compiled and analyzed in the context of the model, the results of which will be compiled in a comprehensive report that describes all data and site locations, model development, assumptions, and scenarios, and subsequent determinations. This information will be presented within the context of the TMDL and water quality restoration plan document.

Task 4 – Temperature Source Assessment

The field effort and QUAL2K model will attempt to identify and quantify pollutant loading from all of the potentially significant point and non-point sources within the Boulder-Elkhorn TPA. Potential source categories that will be investigated primarily stem from reduced shade from riparian impacts such as grazing, cropland management, road development and encroachment, historic mining through stream corridors, and other forms of human impact to riparian health. In addition, irrigation withdrawals and returns, stream channel widening and other morphological disturbances, and natural background, seeps, and springs all have potential effects on stream temperature and will be included in source assessment investigations.

Task 5 – Temperature TMDL & Allocations

The TMDL and allocations for the temperature pollutant/water body combinations will be linked to the results of the Tasks above. The TMDL for temperature will be calculated based on the results of the QUAL2K model, and will incorporate each of the major source types/land use categories assuming all reasonable land, soil, and water conservation practices are in effect. Source types include riparian shade, roads, irrigation withdrawal/returns, stream morphology, and potential point sources. Appropriate allocations will be developed through an investigation of potential changes in land and water management. Allocations will be developed through

partitioning the appropriate percent reductions to the source types/source areas based on case studies, literature values, model scenarios and communication with the TAC.

Task 5a. Draft TMDL, Allocations, and Stakeholder Reviews

Draft TMDL and allocations will be compiled based on the above analysis and discussed with the TAC. Comments from the TAC will be considered and included where appropriate into the final TMDL and allocations. Analysis of data and final conclusions will be compiled into a report for inclusion into the TMDL document. TMDL and allocations will be developed in winter spring of 2011.

Task 6 – Document Preparation and Public Comment

In order to ensure compliance with public and stakeholder TMDL outreach requirements under state and federal law, at the completion of the Boulder-Elkhorn TPA Sediment TMDL document (Draft) the public will have a 30 day comment period to review the document and submit comments. A Final TMDL document will be prepared in consideration of public comment and submitted to EPA for review.

Task 7 – EPA Submittal

The final step in this process will be for EPA to review and approve the final TMDL document.

PART FIVE – TMDL PROJECT MANAGEMENT FRAMEWORK AND OUTREACH STRATEGY

5.1 DEQ's TMDL Project Management Framework

Each TMDL planning area has an internal DEQ TMDL development team. The TMDL development team includes one planner designated as the DEQ project coordinator (PC) and a planner designated as the DEQ project manager (PM) for each pollutant category. The PC serves as a main point of contact, helps ensure a consistent stakeholder outreach approach and consistency where there is overlap in pollutant assessment methods. The PM is responsible for technical and administrative aspects of TMDL development for the assigned pollutant category including completion schedule, scope development, strategy implementation, stakeholder relations, and final TMDL document content and production. The project management structure for the Boulder-Elkhorn TPA is as stated in the project management table on Page One of this plan.

Other DEQ Personnel:

Other DEQ personnel can play an important consultation role and possible TMDL development team role regarding subdivision, septic, abandoned mines, waster, or other source impacts and pollutant reduction solutions. For the Boulder-Elkhorn TPA, additional personnel are anticipated as follows:

- Steve Cook will have a significant role in the sediment source assessment process, focusing on the sediment and habitat assessment and unpaved roads assessment.
- The Water Quality Monitoring (WQM) Section will provide resources for metals, nutrients, and temperature sampling and data management under the supervision of the WQM Supervisor, Rosie Sada.
- The PC and sediment PM will work with DEQ Abandoned Mines and Reclamation personnel to gather information and data for the metals assessments.
- The PC and nutrients PM will consult with the Permitting and Compliance Division regarding any WLAs to NPDES permitted facilities.
- Additional peer review will be provided by DEQ's Watershed Management Section (WMS) personnel involved with similar TMDL work, as well as by the WMS Supervisor, Dean Yashan.
- Draft and final document compilation, as well as public comment assistance, will be provided by DEQ Water Quality Planning Bureau administrative staff.

5.2 Stakeholder and Outreach Strategy

The DEQ will pursue implementation of the stakeholder and public involvement strategy as defined below. In many situations there will be individuals who may be a member of more than one of the below groups.

Conservation District (CD): The DEQ will provide Jefferson Valley Conservation District with a consultation role opportunity during TMDL development consistent with State Law (75-5-703). This will include CD comment opportunities during the various stages of TMDL development, and an opportunity for CD participation in the Watershed Advisory Group defined below.

Watershed Advisory Group (WAG) – Representatives of applicable interest groups will be requested to work with the DEQ and CD in an advisory capacity per State Law (75-5-703 & 704). Comment opportunities will be obtained from this group at varying stages of TMDL development, including opportunities for TMDL draft document review prior to the public comment period. During TMDL development, meetings or other forms of interaction will be pursued when appropriate to obtain timely WAG advice and comments. The DEQ PC and DEQ PMs will work together to coordinate all WAG interactions and meetings during TMDL development.

The WAG provides advice and comment during TMDL development; they do not have TMDL decision making authority. Therefore, there is no need for a WAG chairman or similar formalities. Formation of the WAG has been initiated and its members as determined at the time of this plan's development are shown below in **Table 5-1**. TAG members representing land management agencies are also considered part of the WAG.

Table 5-1: Members of the Boulder-Elkhorn TPA Watershed Advisory Group	
Name	Organization
Kris Hugulet	Jefferson Valley CD
Tom, Carey Jr.	Jefferson Valley CD District Supervisor
Mark Gornick	Jefferson Valley CD District Supervisor
Meghan Bullock	Jefferson County Sanitarian
Harold Stepper	Jefferson County Planner
Dennis Wortman	Town of Boulder Public Works Director
Bob Sims	Lower Jefferson River Watershed Council
Debbie Shea	Montana Mining Association
Rich Day	Trout Unlimited George Grant Chapter
Kerri	Boulder Hot Springs
John Kountz	Koutnz-Spire Rock LLC / Jefferson River Watershed Council
Carolyn Lewis	Boulder River Recreational Trails Committee
John Koerth	DEQ Abandoned Mines Supervisor

Technical Advisory Group (TAG) – The TAG will be comprised of individuals with intimate knowledge about scientific issues, processes, and sampling design, as well as familiarity with the TPA where TMDL development is underway. Individuals may include representatives from State and Federal agencies, local resource professionals, or members of local government, including CD members that have an appropriate level of relevant technical knowledge. The DEQ PC is responsible for TAG formation and is the primary DEQ contact regarding TAG meeting

coordination. It is envisioned that the TAG will be the same for all pollutant categories, although there may be some case-by-case variances.

The TAG provides technical advice and comment during TMDL development for components such as water quality assessments and sampling designs. The DEQ maintains responsibility for technical decisions applied toward TMDL development. Formation of the TAG has been initiated and its members are shown below in **Table 5-2**.

Table 5-2: Members of the Boulder-Elkhorn TPA Technical Advisory Group TAG	
Name	Organization
Ron Spoon	MFWP
James Brammer	USFS: Beaverhead-Deerlodge National Forest
Ronnie Maurer	NRCS
Corey Meier	BLM
Tom Cleasby	USGS
Doug Compton	MDT
Jim Brown	DEQ PCD Town of Boulder Permit Writer
Jeff May	DEQ PCD Boulder Hot Springs Permit Writer
Joe Griffin	MDEQ Remediation Division - Luttrell Depository Project Officer

General Public Involvement:

The DEQ will hold public meetings during TMDL development on a case-by-case basis. For all TMDLs developed, a public meeting will be held during the public comment period of document completion. DEQ SOP WQPBS WSM-001a identifies the internal DEQ process and responsibilities during the public meeting and public comment period.

Where general members of the public express interest in the TMDL process or specific aspects of the TMDL, the PC and PM may keep a list of interested parties that can receive specific notification of public meetings and public review or update material.

PART SIX – IMPLEMENTATION DETAILS

This section lists the anticipated planning documents for the project. Planning documents include this plan, sampling and analysis plans (SAP), and modeling reports. This section is a working section and will be updated as the project progresses.

6.1 Metals

Planning Documents

Document	Document ID	Status
2009 Boulder-Elkhorn TMDL Planning Area Chemistry and Chlorophyll Monitoring SAP	M07-TMDL-01-SAP1	Complete
Boulder-Elkhorn TMDL Planning Area Sampling Project – 2010: Nutrients & Metals SAP	M07-TMDL-01-SAP2	In Progress

Contracts

Contract Name	Contract #	Contractor	Contract Mgr	Status
2009 Metals	207062	Hydrometrics	Tim Byron	Complete

Anticipated Deliverables

-

6.2 Nutrients

Planning Documents

Document	Document ID	Status
2009 Boulder-Elkhorn TMDL Planning Area Chemistry and Chlorophyll Monitoring SAP	M07-TMDL-01-SAP1	Complete
Boulder-Elkhorn TMDL Planning Area Sampling Project – 2010: Nutrients & Metals SAP	M07-TMDL-01-SAP2	In Progress

Contracts

Contract Name	Contract #	Contractor	Contract Mgr	Status
2009 Nutrients	207062	Hydrometrics	Tim Byron	Complete

Anticipated Deliverables

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6.3 SedimentPlanning Documents

Document	Document ID	Status
2010 Road Sediment Data Collection	To Be Determined	In Progress
2010 Sediment & Habitat Data Collection	To Be Determined	In Progress

Contracts

Contract Name	Contract #	Contractor	Contract Mgr	Status
Boulder-Elkhorn TPA Upland Sediment Modeling	210157	Confluence	Jim Bond	In progress
Boulder-Elkhorn TPA: Sediment and Habitat Field Data Collection and Reporting	210126	WET	Jim Bond	In progress

Anticipated Deliverables

- Sediment and Habitat Field Data and Data Compilation/Summary Report
- Upland Sediment Model results and report

6.4 TemperaturePlanning Documents

Document	Document ID	Status
Boulder Elkhorn TMDL Planning Area Temperature and Instantaneous Flow Measurements for the Boulder River Sampling and Analysis Plan (2010)	M07-TMDL-01-SAP-03	In Progress

Contracts

Contract Name	Contract #	Contractor	Contract Mgr	Status
Boulder-Elkhorn Temperature Modeling and Reporting	210127	PBS&J	Jim Bond	In Progress

Anticipated Deliverables

- Flow, Temperature, and Shade data for the Boulder River watershed
- QUAL2K Model and results

PART SEVEN – QUALITY ASSURANCE REPORTING

This section describes quality assurance (QA) measures and reporting for each pollutant. The primary focus of the data quality analysis will be to ensure the data has sufficient quality to minimize errors in decision making.

All sampling and analysis plans (SAPs) address the appropriate QA and quality control (QC) measures identified under the Bureau's Quality Management Plan (DEQ 2008). QA/QC methods are consistent with those defined in the Water Quality Planning Bureau's Quality Assurance Project Plan (QAPP) for Sampling and Water Quality Assessment of Streams and Rivers in Montana (DEQ 2005) and are approved and tracked by the QA Officer. All SAPs describe their data quality objectives and data quality indicators and include measures for assessing them.

QA/QC reviews are included as part of all nutrient, metals, sediment, and temperature SAPs, modeling efforts, and respective scopes of work. DEQ Project Managers review all stream stratification results, field and laboratory data, QA/QC reports, data quality summaries, modeling outputs, and final reports for quality and usability of data, accuracy, and completeness. All SAPs are tracked by the Bureau's Quality Assurance Program.

Laboratory analysis for nutrient and metals samples is completed by State-approved labs adhering to DEQ protocols and reporting requirements for analytical data (DEQ 2009). Laboratory data is stored within EPA's National STORET data system.

PART EIGHT – PLAN MODIFICATION SUMMARY

This section will be used to document future plan modifications if needed.

REFERENCES

- DEQ 2005. Quality Assurance Project Plan (QAPP) Sampling and Water Quality Assessment of Streams and Rivers in Montana, 2005. *Available at* <http://deq.mt.gov/wqinfo/QAProgram/default.mcp>
- DEQ 2008. Quality Management Plan, Water Quality Planning Bureau, Revision – 2. *Available at* <http://deq.mt.gov/wqinfo/QAProgram/PDF/QMP%20WQPBQMP-001Rev2.pdf>
- DEQ 2009. Minimum Reporting Requirements for Analytical Data (Chemistry) for the Water Quality Planning Bureau, SOP WQPBDM-010, 2009. *Available at* http://deq.mt.gov/wqinfo/QAProgram/PDF/WQPBDM-010_Rev2.pdf